Completing Our Streets:

Lessons for Los Angeles from peer agencies creating safer, multimodal streets

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16. Abstract
This report analyzes ten peer cities across the state, country and globe with the goal of providing best practices and lessons learned for Los Angeles' update of its street design guidance: Atlanta, Dallas, London, Mumbai, Philadelphia, San Diego, San Francisco, San Jose, Toronto, and Washington DC. Specifically, the report examines each city's development and implementation of its street design guidelines through semi-structured interviews and an analysis of six priority complete streets design treatments. Treatments analyzed include corner radii, curb extensions, pedestrian refuge islands, raised crosswalks, roundabouts, and transit platforms. Based on my analysis, I recommend three policy guidelines for the City of Los Angeles: 1) prioritize street design regulations over recommendations, 2) choose flexibility over specificity, and 3) create unified documentation.

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EXECUTIVE SUMMARY

For most of the past 100 years, the goal of street design in the United States was to move vehicular traffic as quickly as possible. However, as politicians, planners and the general public have experienced the multitude of negative externalities that stem from car-centric culture, street design is shifting toward a new norm: providing safe, efficient access to every user. Recent Los Angeles street design documents like the Complete Streets Design Guide provide recommendations for safer, multimodal streets. However, these recommendations are misaligned with many of the city's existing car-oriented regulations, and they are not consistently applied. Today, the City of Los Angeles is in the process of reviewing and refreshing its currently mismatched street design guidance.

This report analyzes ten peer cities across the state, country and globe with the goal of providing best practices and lessons learned for Los Angeles' update of its street design guidance: **Atlanta, Dallas, London, Mumbai, Philadelphia, San Diego, San Francisco, San Jose, Toronto,** and **Washington DC**. All cities have recently updated or created complete-streets-centric street design guidance. Specifically, the report examines each city's development and implementation of its street design guidelines through semi-structured interviews and an analysis of six priority complete streets design treatments. Treatments analyzed include **corner radii, curb extensions, pedestrian refuge islands, raised crosswalks, roundabouts,** and **transit platforms.**

The following categories are discussed across all cities: how they attempted to address misaligned policy, prioritize complete streets goals, and create guides specific enough for today and flexible enough to address changing transportation and mobility needs of their populations. I find that there are three main influences on street design guidance development:

1) level of support from leadership;
2) car-centric or complete-streets-oriented existing policies, and

3) the ability of staff to coordinate across different departments and stakeholders.

For implementation, success depended on the level of enforceability of the final document, a balance of prescriptive and flexible parameters for how, when and where to deploy design treatments, and an adequate amount of guidance for context-specific decision-making and prioritization.

All cities diverged on attitudes around the need to change street design guidance in the future: some saw the need to update manuals to address shared mobility and the possibilities of autonomous vehicles, some wanted to wait until change was certain, while others were not sure that changes in mobility options would require fundamental shifts in street design. However, all were proponents of guidelines that could adapt to new transportation innovation.

Based on my analysis, I recommend three policy guidelines for the City of Los Angeles:

1. **Prioritize street design regulations over recommendations:**
Cities may find it easier to develop recommendations than to integrate design guidelines into city regulation. However, recommendations lack the enforcement power necessary to implement complete streets projects. Los Angeles already has a recommendations document in its Complete Streets Design Guidance, and needs additional enforcement power.

2. **Choose flexibility over specificity:**
Over-prescriptive manuals can limit where and when a design treatment can be deployed. Guidelines should aim for measured flexibility. This means providing a range of measurements based on different street typologies or modal priorities, while acknowledging the potential for modification based on context.

3. **Create unified documentation:**
To facilitate adherence to city policies and regulations for street design, Los Angeles should have all street guidance in one document.

BACKGROUND

Los Angeles is at a crossroads. Angelenos expect their streets to support a wide range of uses – from conventional motor vehicle traffic and freight, to transit and shared mobility services, to biking and walking. There is increased interest in routinely using streets for community events and festivals, and autonomous vehicles and other new mobility technologies are on the horizon. Underlying all of this is the City's responsibility to ensure that streets are safe and support the mobility needs of all system users. Additionally, the transportation system must support broader City goals related to equity, economic development, sustainability, and quality of life.

The current Bureau of Engineering (BOE) Street Design Manual and Los Angeles Department of Transportation (LADOT) Manual of Policies and Procedures have been in use for decades and need major updates to prepare the City for the future. Much of the Street Design Manual has not been updated in decades, and it reflects the design guidance typically seen in California in the 1970s. The City of Los Angeles' recently developed Complete Streets Design Guidelines demonstrate a shift toward multimodal streets focused on prioritizing pedestrians, cyclists, and transit riders. However, these guidelines are recommendations rather than regulations, and do not replace the outdated, car-centric standards seen in the BOE manual. Today, the city is beginning a process to review, refresh and potentially unify its currently disjointed and mismatched street design guidance.

My report looks across the state, country and globe to provide best practices and lessons learned for Los Angeles' upcoming review and refresh of its street design guidance. In this report, I review and analyze street design guidance in ten different cities, focusing on the creation and implementation of street design manuals. I look closely at the following guidance categories across all cities: how they attempted to address misaligned policy, prioritize complete streets goals, and create guides specific enough for today's use and flexible enough to address changing transportation and mobility needs.

RESEARCH QUESTIONS

- **What are the best practices and pain points for agencies developing guidelines for street design, and how can these lessons be applied to Los Angeles?**

- **How can Los Angeles and other public agencies ensure that manuals are flexible and future-facing to address changing mobility needs?**

LITERATURE REVIEW

The End of Auto-Centric Street Design?

For decades after the rise of the automobile in the early 20th century, the goal of street design in the United States was to move vehicular traffic as quickly as possible. In the first two decades of the 1900s, the number of automobiles grew from thousands to millions (Hawkes and Sheridan, 2009). After WWII, the boom in car and home ownership influenced transportation infrastructure - roadway engineers focused almost entirely on promoting the safety, convenience, and comfort of automobile travel. By the mid-twentieth century, other modes of travel were de-prioritized even further, with the Federal Transit Authority stating that the "burden" of accommodating pedestrians and bicyclists was "impossible" as they had to provide enough space for cars (Hawkes and Sheridan, 2009).

Fig 1: Example of forgiving design

Source: National Complete Streets Coalition

Fig 2: Example of forgiving design

Source: National Complete Streets Coalition

As the number of American households with automobiles grew in the second half of the twentieth century, planners continued to adapt street design and development to better serve vehicular travel (Handy, 1993). Wider streets with easy-to-navigate curves and large clear-zones were part of a forgiving design strategy meant to lessen collisions. This philosophy was promoted

for decades in national guidelines produced by the American Association of State Highway and Transportation Officials (Dumbaugh, 2005). However, more recent studies have shown that a road more forgiving to drivers is not a safer road – forgiving design encourages high-speed travel and can lead to more injury and death, especially in denser urban areas (Dumbaugh, 2005).

By the end of the twentieth century, the negative externalities of car culture were becoming apparent, and government officials saw the need to address inequities in infrastructure provided for those who didn't travel in cars. In 1991, Congress passed the Intermodal Surface Transportation Efficiency Act, requiring every state to create a long-range transportation plan that addressed the needs of people walking and bicycling (Yusuf et al, 2016). This legislation was followed by further bills on both federal and local levels increasing funding for active transportation and other street safety projects. Today, public agencies continue to turn their attention to other travelers beyond drivers, building and retrofitting streets to serve a wider range of modes.

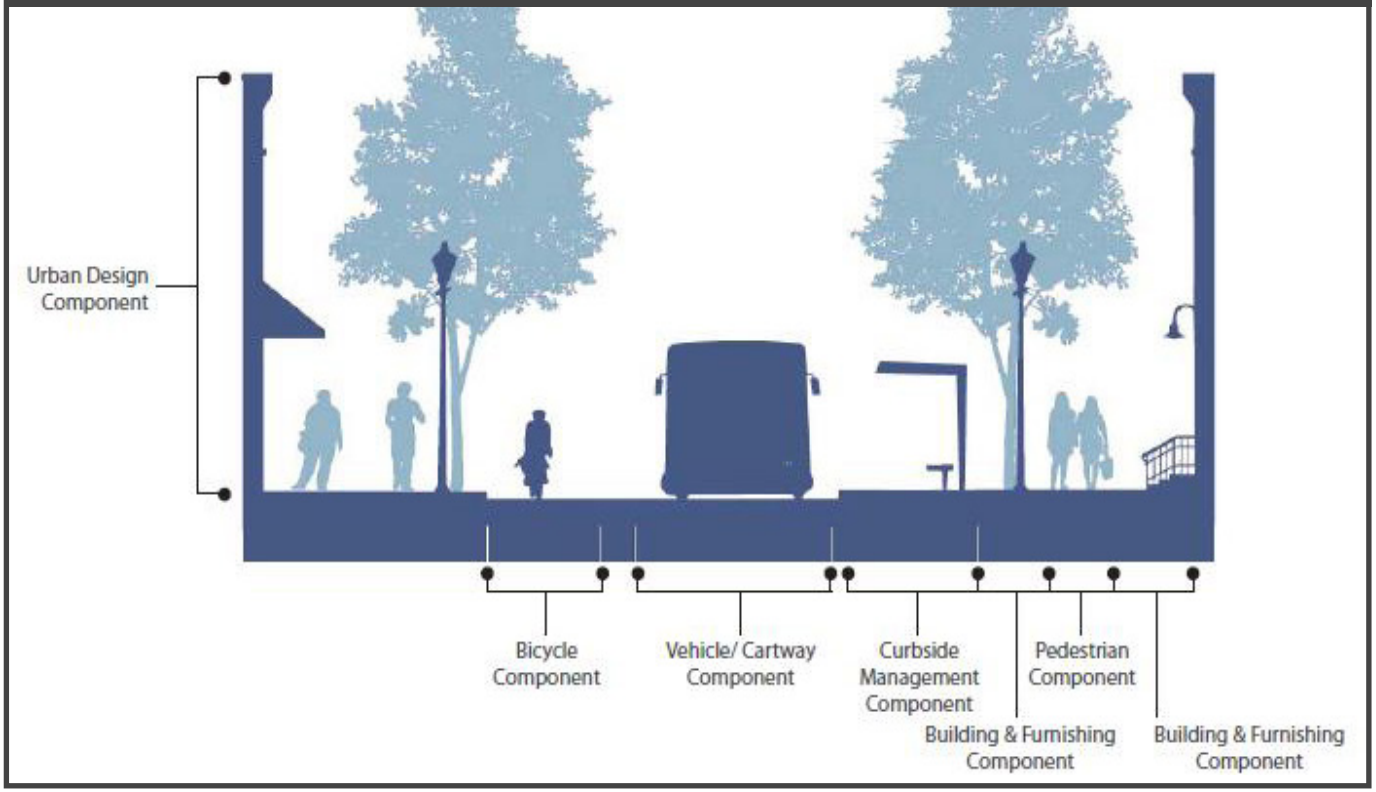
Toward Complete Streets

Many major metropolises in the 21st century are aiming to become "sustainable cities," focusing on policies consistent with the "three E's of sustainability: environmental protection, social equity, and place-based economic development (Jepson, 2004). Today's progressive policymakers aim to go "beyond which is energy efficient or transport efficient, [and] explore the totality of the city as a place in which to live" (Bannister, 1992). Seen in this new light, streets are not merely functional infrastructure to drive through as one travels to a final destination, but as public space that can be used for a variety of diverse activities.

Along with this newer attitude toward streets has been the development of street design policies with the explicit goal of providing safe mobility for everyone, not just car users, referred to as a "complete streets" policy (see Figure 3 for diagram of a complete street). Pedestrian-friendly streets have been linked with many quality-of-life improvements, including economic growth, better public health, and air quality improvements (Dumbaugh, 2005). In addition to embracing the benefits of more multimodal

streets, cities are attempting to address the dangers of streets that prioritize cars – from 2008 to 2017, pedestrian deaths in traffic collisions rose across the United States by 35% (Smart Growth America, 2019). Emphasis on street design that is safer for all users has seen support from a wide range of cities – as of 2014, 30 states have state-level policies that incorporate a complete streets design philosophy, and as of 2016, over 1000 US cities have created complete streets policies (Yusuf et al, 2016; National Complete Streets Coalition, 2016).

Fig 3: Elements of a Complete Street



Source: Philadelphia's Complete Streets Design Handbook

Today's street design policies often include goals of livability, placemaking, access, mobility, safety, flexibility, context, balance, a healthy environment, and visual excellence (Hawkes, Sheridan, 2009).

Urbanized areas are more likely to incorporate complete streets goals into their policies, and these goals have become more comprehensive over time. According to analysis from the National Complete Streets Coalition, the most recently passed policies are the strongest yet in terms of stating a vision, providing for all users, addressing community needs, and establishing an implementable project delivery approach (National Complete Streets Coalition, 2016).

The most recently recognized cities with best practices in complete streets initiatives are diverse in size, geography, and governance, and include Baltimore, Maryland, Las Cruces, New Mexico, Philadelphia, Pennsylvania, and Quebec City, Quebec (National Complete Streets Coalition, 2017).

Difficulties Incorporating Complete Streets

Despite a spreading desire for safer and more multimodal streets, cities and states have come up against difficulties in enacting design change. According to the National Complete Streets Coalition, a comprehensive complete streets policy must include a vision, user-specificity, commitment in all projects and phases, clear exceptions, interagency coordination, community context, performance standards, and next steps for implementation (National Complete Streets Coalition, 2018). Meeting all of these criteria in a meaningful way has proved to be a challenge for many cities. Effective implementation and enforcement of complete streets policies often depends on how the policy is incorporated into the regulatory environment of overall city street design guidance. While some policies are suggestions that do not require enforcement over existing engineering standards, others integrate into current city codes and zoning regulations (Hawkes and Sheridan, 2009).

Additionally, tension emerges between planners and engineers due to the way control over street design is divided – planners often

oversee the initial phases and develop a vision for street projects, while engineers take over later in the process (Dumbaugh and King, 2018). The planners' vision is then filtered through engineering requirements, and the result is often one that neither planners, engineers, or the general public are happy with.

Reforming official agency documents regarding traffic engineering can be complex, and the process is often is met with significant obstacles and debate (Henderson, 2011). Even when high-level policies encourage safer streets with less focus on the automobile, change on a street or corridor level can often be blocked by institutional barriers promoting car-oriented design (Hess, 2014). Additionally, competing needs between different levels of government and existing budgeting processes can produce an environment that continues to prioritize motor vehicles. For the public sector to successfully transform existing policy and regulations, change must be seen as a mainstream agency program, and agencies must commit to evaluation, research, and knowledge building and sharing (Chifos, 2007).

However, internal public sector collaboration is not the only way to create new street design guidelines. In Sacramento, complete streets advocates saw success by using a community action model to achieve their policy goals (Geraghty et al, 2009). Through grassroots organizing among residents and local non-profits, the Partnership for Active Communities created walk- and bike-to school programs and community-design workshops that developed recommendations for improved street infrastructure. Due to their activism, complete streets initiatives were adopted in the region's transportation plan and transit master plan, as well as in the mobility element of Sacramento's general plan.

Los Angeles: Outdated Street Design

7,500 miles of public streets weave across Los Angeles, making up most of the city's public space. However, these streets are still mostly governed by an outdated street design manual. Created by the Los Angeles Bureau of Engineering, the manual was last updated in 1986. Its design guidance reflects attitudes of the 1970s, and is oriented toward predominantly

automobile traffic. The manual's guiding vision is one of access control, a philosophy in which the public authority regulates access to arterials and highways by limiting interaction between different travel modes (Los Angeles Bureau of Engineering, 1986). Similar to the "forgiving design" seen in mid-twentieth century street planning, the manual gives preference to vehicle through-traffic and separates any other types of travelers in order to prevent conflicts between modes. However, this separation replaces one set of safety problems for another. Research has shown that when streets are designed for modal separation and privilege high-speed travel, the resulting streetscape environment can cause an increase in traffic-related collisions and injuries (Dumbaugh and Rae, 2009).

Safer street networks should simultaneously support lower speeds while accommodating multimodal access. While some city policy recommendations do center safety and multimodal travel, much of the guidance used by city staff when planning streets lacks flexibility and does not prioritize complete streets.

Conflicting Street Design Policies in LA

Despite failing to update its Street Design Manual, the City of Los Angeles has created other mechanisms to influence its roadways. LA's Complete Streets Design Guide explicitly states that streets are for more than just moving cars, and promotes a design attitude that centers safety, accessibility, and convenience for all transportation users (Complete Streets Design Guide, 2012). In 2016, the city adopted a Complete Streets policy, and more recently it launched a Vision Zero Action Plan to improve roadway safety.

However, the launch of newer guidelines and initiatives regarding the streets has created conflict for designers, engineers and planners. A few examples of existing conflicts include differing roadway classification systems and vehicle speed requirements across existing documents, as well as a lack of direction (in the BOE manual) for transit or bicycle-focused street design.

In interviews conducted by Toole Design of the departments involved in street design (Planning Department, BOE, LA Metro, and LADOT), city staff raised the following challenges in existing street design guidance:

Complete Streets Design Guide

- Lack of specific criteria and parameters
- Not always used by engineers: staff at LADOT and Planning state that street design process should begin with this guide along with the Mobility Plan

BOE Street Design Manual

- Lack of guidance for engineers on certain new street elements
- Lack of guidance for meeting ADA requirements
- Lack of guidance for street design elements interaction with stormwater
- Difficult to navigate: paragraph form creates challenges when searching for important or necessary information

All Manuals

- Need for “future-proof” guidance: manual should not be static and be changed when needed

Staff across the city understand that there is an obvious need to eliminate conflicts in existing documentation to ensure design guidance consistency across all departments.

METHODOLOGY

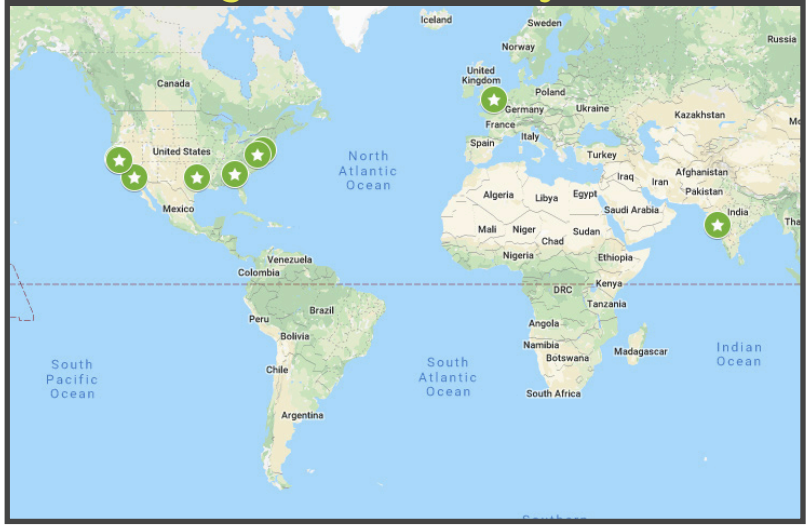
For my analysis, I examined peer agencies from large urban cities across the state, country, and globe.

Cities eligible for analysis met the following requirements:

- Cities that have developed or updated their street design guidelines within the last decade (8/10 cities had documents created or updated in the past five years or less)
- Cities with developed and built-out urban cores
- Cities that currently sustain populations of approximately 1 million or more.

I originally reached out to 20 potential peer cities/ agencies, ten of whom responded and proceeded to the interview stage. Three of the ten final cities were in California, as my goal was to ensure adequate representation from peer agencies dealing with similar funding and regulatory landscapes.

Fig 4: Ten Cities Analyzed



I conducted semi-structured interviews with public agency staff or consultants from the following cities:

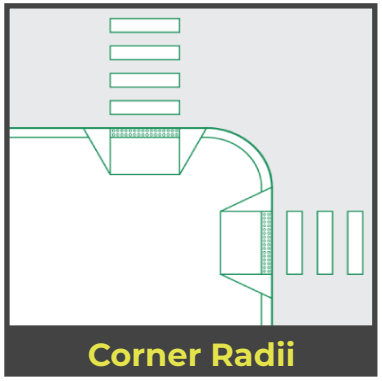
- **Atlanta, GA**
- **Dallas, TX**
- **Philadelphia, PA**
- **London, England**
- **Mumbai, India**
- **San Diego, CA**
- **San Francisco, CA**
- **San Jose, CA**
- **Toronto, Canada**
- **Washington D.C.**

Interviewees included transportation planners, engineers, urban designers, andt consultants - all were staff that dealt either with the creation of and/or the implementation of the city's existing street design guidelines (see Appendix A for full list of interviewees). Eight of the ten interviews were 30-45 minute phone interviews, and two (London and Mumbai) were conducted via email. See Appendix B for the interview instrument used to conduct both phone and email interviews. In these interviews, I aimed to go beyond simple retelling of the city's guideline development and implementation process – I wanted to address the successes and challenges of the process and gauge staffer's opinions and feelings about the final product. I refer to each interviewee by city name instead of individual name for the purposes of this report.

I also reviewed each agency's relevant street design document(s) for six priority design treatments (see Appendix A for full list of documents reviewed). These design treatments were selected as priorities for research and analysis by my client, Toole Design, as they reflect areas where current Los Angeles street design guidance is misaligned or missing.

In my evaluation of each treatment, I awarded points based on the level of guidance in each manual. See Appendix C for my complete scoring methodology, Appendix D for individual scores for each city and design treatment, and Appendix E for normalized scores by treatment.

On page 14, I define each of the six priority treatments evaluated in this report and explain their importance as a complete street intervention: **corner radii, curb extensions, pedestrian refuge islands, raised crosswalks, roundabouts,** and **transit platforms.**



Corner Radii

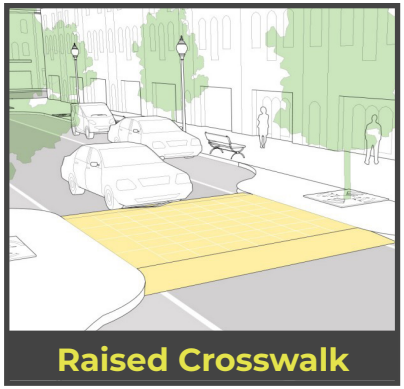
The radius of corners at intersections impacts turning vehicles and pedestrian crossing distances. Larger curb radii usually result in higher-speed vehicle turns, while shorter curb radii slow down turning vehicles and create shorter crossing distances for pedestrians.

Curb Extension

Curb extensions (also referred to as neckdowns or bulb-outs) extend the sidewalk or curb line into a parking lane, reducing the width of the street. They encourage slower vehicular speeds reduce pedestrian crossing distances and can improve visibility for both drivers and pedestrians.

Pedestrian Refuge Island

A pedestrian refuge island (also called a crossing island, median refuges, or central refuge island) is an area protected by curbs where pedestrians can wait for a pause in vehicular traffic or rest while crossing the street.

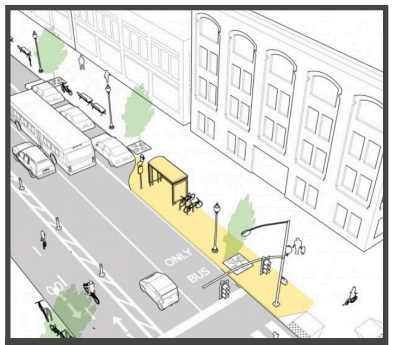


Raised Crosswalk

Raised crosswalks (also called speed tables or table tops) are elevated pedestrian crossings, and raised intersections are speed tables that extend throughout the intersection. They provide pedestrians with a level street crossing, increase visibility of pedestrian crossings, and force vehicles to slow down.

Roundabout

Cities and transportation agencies throughout the US have mixed definitions of a roundabout. I define roundabouts as a traffic calming device with yield-controlled entry, circulating roadway, and central island. Roundabouts reduce vehicle-to-vehicle conflicts and vehicle-to-pedestrian conflicts, and also reduce collisions.



Transit Platform

Transit platforms are curb extensions that serve a transit stop. They provide more room for rider amenities, facilitate accessible boarding, and reduce transit vehicle delay due to eliminating the need for the vehicle to merge in and out of traffic at the transit stop.

INTERVIEW FINDINGS & ANALYSIS

In the following sections, I analyze interviewees' challenges, best practices and future considerations for development and implementation of street design guidelines. See Figure 5 for an overview of common words and phrases in the interview process.

For the purposes of this analysis, I've categorized each of the ten cities as either car-oriented or people-oriented. These two broad categories reflect when a large share of buildings and roads were built: before widespread adoption of auto-centric street design and general planning (1940s and onward in the US), or afterwards. For the purposes of this analysis, I consider Los Angeles a car-oriented city.

Fig 5: 60 Most Common Interview Words

CAR-ORIENTED CITIES		PEOPLE-ORIENTED CITIES
• Atlanta, GA • Dallas, TX • Mumbai, India	• San Diego, CA • San Jose, CA • Toronto, Canada	• London, England • Philadelphia, PA • San Francisco, CA • Washington D.C

GUIDELINE DEVELOPMENT

Across car-oriented and people-oriented cities, interviewees mentioned three main influences on their creation and use of the guidelines:

1. **Support from leadership**
2. **Obstacles and opportunities in existing regulations**
3. **Staff's ability to coordinate across different departments and stakeholders**

Support from Leadership: Buy-in is Crucial

The majority of cities interviewed had developed or updated their guidelines after direction from city leadership, whether from the mayor's executive order or city council resolution. This endorsement and guidance from local leadership made it easier to establish staff buy-in, as well as procure funding. In Atlanta, the street design guide was created as technical policy support for the vision of city's general plan. In Dallas, San Francisco and Philadelphia, city leadership (mayors or city council) asked city departments to update outdated guidelines focused on vehicular throughput with a more progressive, complete streets philosophy.

Los Angeles is poised to take advantage of current leadership's move away from prioritizing cars and advocacy of safer, more efficient, and multimodal-supporting street design. Existing Vision Zero and Complete Streets initiatives are proof of leadership's commitment to safer streets, and city staff are already engaged in the process of updating street design guidance.

Existing Policies: Help or Hindrance?

While some cities created street design guidelines as entirely new documents (Atlanta, Dallas, Philadelphia, San Jose, and Toronto), no city was starting from wholly from scratch. However, existing design guidance could be a resource or an obstacle to staff efforts to update documentation with a focus on complete streets.

In Toronto, the city had been working on

complete streets projects for many years before developing its Complete Streets Guidelines, and existing engineering standards for street design had been updated recently to align with the safety standards and multimodal approach of complete streets. Creating Toronto's Complete Streets Guidelines was just another step to unify complete streets design, and staff could reference existing policy in their document development.

San Diego dealt with a different context. Existing documents were auto-centric, but the vision and values of the city had changed, and leadership asked for design guidelines that were aligned with complete streets. In this case, the traffic engineers developing the guidelines had to create what they referred to as a "paradigm shift" and push back on existing regulations. This created additional challenges when meeting with outside departments like the fire department and trash collection services, who were reluctant to adopt guidelines that could narrow streets and limit access for emergency vehicles and trash pickup.

Existing policy in Los Angeles spans both ends of the spectrum – the BOE manual is heavily car-centric, while the CSDG explicitly prioritizes roadway users who are not in vehicles.

Interdepartmental Collaboration: Breaking down Silos

Every interviewee mentioned the complexity of their city's structure – multiple entities and departments manage and/or operate in the public right of way, so development of street design guidelines necessitated interdepartmental collaboration.

"We find that [interdepartmental] conversations and negotiations early in the design process are really useful. Usually we get a really good outcome because of those discussions."

Multiple cities mentioned the challenge of dealing with departmental silos. Although pushback from engineers or staff with more traditional auto-centric design views was mentioned as an issue, the primary challenge was ensuring that every department knew about all existing policies and procedures, as well as

when and how to work together.

Washington DC made a point to explain the importance of breaking down “thick silo walls”. One interviewee mentioned a specific example he’d seen in another city – staff had created a new street design guide, but failed to reach out to all affected departments to ensure compliance. Staff found out their mistake when they saw a new development with tree boxes sized far smaller than current standard – it turns out that one staffer was still passing out decades-old tree box guidance to developers. To prevent situations like this from occurring in Washington DC, the city went through a re-organization process in 2010, and staff created a new “Project Development Review Meeting” process. This interdepartmental process involves planners, engineers and permitting staff, who work with developers to review early stage plans. Now, a cross-departmental team works closely together on all new development projects to ensure that public infrastructure standards are followed.

San Francisco attempted to break down their departmental silos by creating an interdepartmental Street Design Advisory Team (SDAT). Representatives from San Francisco’s planning department, public works department, and public utilities commission meet weekly and oversee planning applications for development. The team reviews all streetscape plans to ensure conformity with their Better Streets Plan. This group of cross-departmental experts can also provide additional information on specific departmental requirements that aren’t included in the BSP – my interviewee called out examples like bulb out widths and landscaping dimensions around parking meters as hyper-specific information useful for project development but not detailed in the Better Streets Plan.

Los Angeles shares the challenge faced by all cities interviewed: multiple departments manage different aspects of the public right of way, creating the need for cross-departmental work to develop and update existing guidance.

GUIDELINE IMPLEMENTATION

I asked interviewees to share what they deemed the most successful aspect of their guide or manual. Success stories include the benefits of opening up new dialogue and creating additional review processes, while areas with room for improvement were related to lack of enforceability and weak and/or vague directions.

Success Story: Opening Up New Dialogue

For car-oriented cities, the value of new conversations spurred by the process of developing design guidelines was invaluable. Atlanta, San Diego, and Toronto mentioned that the process allowed for resolution of tensions between planners and engineers who previously disagreed on how to create complete streets.

In Toronto, these successful conversations were facilitated by a public outreach consultant. This third-party was crucial to act as a neutral mediator, creating a safe space for city departments and staff to hash out tensions over which transportation modes should get priority, set standards for certain design treatments, and resolve other debates.

In San Diego, the project manager knew that the creation of design guidelines has been a project that other city staff had attempted to bring to the finish line to no avail. Stressing the importance of "learning from others," he shared that he sought out previous project managers to learn what worked and what didn't.

San Diego found that the process to develop design guidelines was missing a consensus building forum where stakeholders from multiple disciplines and interest groups would work collaboratively together. Instead the process was disjointed where meetings with individual stakeholders were held separately.

"When you put everybody all in the same room, it allows for a dialogue amongst stakeholders to take place where different points of view, perspectives and concerns are shared and understood by all."

To address this lack of open dialogue, San Diego created an inter-departmental technical project working group within the city, hosting multiple meetings with "everyone at the table together at once" to discuss potential opportunities and challenges. This open conversation and attempt to address issues with all impacted entities in the room led to a final document that reflected needs of more policy-minded staff, as well as the needs of engineers and designers for specific measurements.

People-oriented cities did not place the same high value on new dialogue as their car-oriented city peers. I believe this is because staffers in these cities were already used to designing and planning projects in a built environment that was much friendlier to non-vehicular modes, and also did not face the auto-centric policies or mindsets of car-oriented cities.

Success Story: New Review Processes

In both car-oriented and people-oriented cities, design guidance development led to changes in review processes or the addition of new methods of review.

Washington DC noted the importance of project review – one interviewee noted that in her work managing many developments and their proposed public space, she rarely saw a plan that was already perfect, and that developers often appreciated finessing their proposed designs with city staff. She recommended all cities incorporate a design review process into project development. DC noted that each city agency has their own focus and priorities, and some agencies may "be so focused on the building portion of the project, they aren't focusing on what's happening in the frontage or how the design connects to the larger city streetscape."

"Now, as we review projects, we ensure that certain classes of projects really pay more thoughtful attention to the variety of needs placed upon city roads."

Atlanta's additional review process was a new report form – a checklist and scoping tool for complete streets to ensure that project managers integrate complete streets goals into their review

of new projects. Philadelphia created a similar process, adding a new layer of review for their Streets Department. New developments must now go through a complete streets review before approval. Although Philadelphia noted that these new review processes add to the workload of staff approving projects, the deliberate insertion of complete streets priorities into the project approval process allows for a holistic view of how safer, multimodal approaches should fit into the development.

Room for Improvement: Lack of Enforceability

Car-oriented cities mostly created recommendations instead of rules, and expressed regret at their guides' lack of enforceability. After Dallas published its Complete Streets Handbook, the recommendations in the document were "not seen as something that had to be followed," and the city is now working to integrate their complete streets guidelines with a new engineering design manual. This will ensure that all city staff must follow complete streets priorities, as they'll be a mandatory part of a regulatory engineering manual.

However, not every car-oriented city saw unenforceable recommendations as a drawback. San Jose's Complete Streets Design Standards and Guidelines includes three levels of enforceability; the city used "standards", "guidelines" and "options" for their document's design guide. Standards are mandatory requirements for design, guidelines are also mandatory but allow exceptions, and options are recommendations for guidelines users to consider. These levels of requirement ensure a base level of complete streets adherence is met, while allowing for context-specific changes to be made based on guidelines and options if necessary.

People-oriented cities were more likely to incorporate the new street design guidelines into rules – Mumbai, London and San Francisco adopted the street design manuals into either their broader city code or part of their general plan. These cities also did not express extensive concern at lack of enforceability. However, San Francisco brought up the importance of understanding the nexus between the guidelines and new development – elements in the city's

Better Streets Plan are only required by law in the streetscape directly fronted or impacted by the property under construction or renovation.

Room for Improvement: Vagueness & Weak Direction

People-oriented and car-oriented cities did not have markedly different perspectives on specificity in their manuals – almost every interviewee mentioned a few areas where their manuals could improve its vagueness. However, some cities considered a lack of specifics as a benefit, noting the importance of flexibility.

Atlanta was concerned that Streets Atlanta was not specific enough, saying the document could sometimes "pull its punches" with regards to assisting staff in prioritizing goals and elements when working on streetscape projects. This lack of specificity and clear guidance regarding the manual's modal priorities hinders engineers and planners ability to make decisions when faced with certain choices or street constraints.

"We could've taken a stronger stance on some of the key issues."

Philadelphia's guidelines are similar to Atlanta's: the manual "sets priorities in general, then raises the level of scrutiny on a project instead of being a prescription for design guidance." Even though it is clear on guiding vision for streets, the manual leaves decision-making up to the professional judgements of individual engineers.

In contrast to Atlanta and Philadelphia, Toronto was supportive of flexibility in their guidance. In areas where their Complete Streets Guidelines lack specificity, the city aims to provide context-specific tools to figure out next steps. Current language in the guidelines "leave[s] the door open" to creating future documents with more specifics. Dallas also appreciated their document's flexibility – the city uses the framework of a variety of street typologies to provide recommendations on design treatments. The interviewee was enthusiastic about the document not being "overly restrictive."

PLANNING FOR NEW MOBILITY

In an evolving transportation world, cities must proactively adapt to changing mobility needs. Private companies exploring ridesharing, carsharing, bikesharing, dockless vehicles, autonomous vehicles, and more are in the public eye more than ever.

"It's been happening so fast that we haven't had time to figure out what that's going to look like."

Both the public and private sector have growing concerns about the region's preparedness for new transportation technology, so I asked interviewees how their design guidance should respond to these new technologies, and if updates are needed. This question elicited the widest variety of responses, including **strong yeses, tentative maybes,** and **hard no's**, but every city mentioned that preparing for new mobility was on their minds.

New Technology = New Guidance

The majority of cities interviewed saw the potential need to update their existing street design guidance to address new mobility and evolving transportation technology. San Diego is already working to add more flexibility into its street design, and is currently researching the benefits of creating a new "flex lane" that can be used by multimodal traffic, including shared mobility devices. London mentioned the potential obsolescence of traffic calming design treatments if vehicles eventually had built-in speed-limiting technology. San Francisco noted current interdepartmental tensions over curb space, which has become more valuable with the rise of shared mobility services, saying that a plan update that addressed these shifting priorities would be helpful. Atlanta mentioned the difficulties in planning for an unknown future and the challenge of building in flexibility without becoming too vague: "It's hard because we don't quite know when it's going to happen or what it's going to be".

Wait and See

San Jose was not sure that new mobility changes would create fundamental shifts in the way

streets are designed. He mentioned the need for a larger state or federal policy discussion on how cities should broadly regulate or accommodate new transportation technology before making more granular decisions regarding street design and operation.

No Change Necessary

Philadelphia called out the need for streets themselves to change, rather than design guidance. For him, the issue was about distribution instead of design, and the focus should be on allocating space in the right way. He believed that there would be limited times when actual design change would be necessary – calling out one example of the potential need to change parking standards if cities start incorporating parking for dockless vehicles.

DESIGN TREATMENTS FINDINGS & ANALYSIS

Overview and Observed Patterns

For my analysis of the six priority design treatments, I referred to each city's primary street design manual (see Appendix A for a full list of all manuals evaluated). All cities provided publicly accessible PDFs of their street design guidance online. I scored each treatment according to seven categories representing complete guidance for development and implementation (policies and procedures, geometric design parameters, integration with utilities, accessibility accommodations, maintenance responsibilities, graphics/tables/standards, and public space and programming, giving them 0-3 points. See Appendix C for my complete scoring methodology and Appendix D for individual scores for each city and design treatment. I aggregated all ten cities' scores from 0-3 on each guidance category and created a normalized score (from 0-1) for each design treatments. 1 represents the most guidance given, while 0 represents the least guidance. See Appendix E for normalized scores by treatment.

POINTS GIVEN

- **0** — **No guidance provided**
- **1** — **Incomplete or partial guidance given**
- **3** — **Exact specifications given**

Every design treatment scored highly on providing policies and procedures –all cities had some mention of what the treatment was, why to use it, and when/where to use it. Public space and programming had the least guidance and was only mentioned for three treatments: curb extensions, pedestrian refuge islands, and roundabouts. However, this may not reflect lack of city interest in public space and programming, but rather the limitations on creating public space or activities in certain design treatments. For example, corner radii (especially the recommended tight corner radii) do not provide additional room for new public space the way a curb extension can. Only one city

(Philadelphia) provided specifics on maintenance responsibilities for each specific treatment. While each city had its own approach, and often its own names for each design treatment, many patterns emerged. After normalizing scores across all treatments, I found that almost every design treatment was missing guidelines for accessibility, maintenance, and public space and programming (all scoring under <0.5 out of 1). The low scores for certain treatments can be explained by the treatment itself – it would be difficult to create public space around corner radii or bus platforms, which have limited physical programmable space. However, only a few cities provided information on accessibility and maintenance – important information that affects all six treatments. I found that curb extensions and pedestrian refuge islands had the most complete guidance, although they (like all treatments) were lacking in accessibility, maintenance and public space information.

Beyond comparing guidance by treatments, I also scored each city for all six treatments. Philadelphia's Complete Street Design Guidelines had the highest scores for five of the six treatments (scoring second highest for transit platforms), while the international cities (London, Toronto, and Mumbai) consistently scored lower than domestic cities.

Table 1: Top 3 Scoring Cities by Treatment

Corner Radii	**Top 3 Scores:** Philadelphia, San Francisco, Washington DC **Bottom 3 Scores:** Toronto, London, Mumbai
Curb Extensions	**Top 3 Scores:** Philadelphia, San Francisco, Atlanta **Bottom 3 Scores:** London, Mumbai, San Diego
Pedestrian Refuge Islands	**Top 3 Scores:** Philadelphia, Atlanta, Dallas **Bottom 3 Scores:** Mumbai, Washington DC, Toronto
Raised Crosswalks	**Top 3 Scores:** Philadelphia, Mumbai, San Diego **Bottom 3 Scores:** San Jose, London, Dallas
Roundabouts	**Top 3 Scores:** Philadelphia, Washington DC, San Francisco **Bottom 3 Scores:** Mumbai, Toronto, San Diego
Transit Platforms	**Top 3 Scores:** Washington DC, Atlanta, Mumbai **Bottom 3 Scores:** San Diego, Toronto, Dallas

Why did Philadelphia's manual score so highly, and why did international cities do so poorly in comparison? Using the example of pedestrian refuge islands, I annotated a page from Philadelphia's Complete Street Design Handbook (see Figure 6 on page 28) to highlight six key elements of the guidelines that illustrate why the handbook received the highest scores:

1. **Clear categorization:** Every design treatment is given its own section with clear instructions on policies and procedures.

2. **Photos and diagrams:** Visuals are prioritized – each treatment has at least one photo of the treatment in Philadelphia or a peer city, as well as a more engineering-oriented graphic.

3. **Parameters and criteria for application:** Specific instructions for why, when and where to use the treatment are provided (including dimensions and relevant engineering standards), as well as additional considerations.

4. **Departmental responsibilities:** Philadelphia was the only city to clearly outline which departments within the city and which private entities are responsible for each part of the treatment's installation and maintenance.

5. **Examples:** When relevant examples of the treatment existed in the city, Philadelphia provided locations for the reader to observe the treatment in person.

6. **Additional resources:** Philadelphia provided both local, regional, and national resources for the treatment when appropriate.

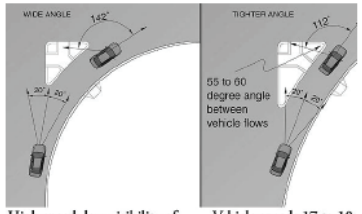
Fig 6: Philadelphia's Pedestrian Refuge Island Guidance (annotated)

TREATMENT 4.9.5

PEDESTRIAN REFUGE ISLANDS

Islands can be used to channelize turning traffic, divide opposing or same direction traffic, and provide a space for pedestrians to safely wait or rest while crossing streets. By breaking long or difficult crossings into several shorter, simpler crossings, islands make it easier for pedestrians to find gaps in traffic, and increase safety.

Clear categorization



High speed, low visibility of pedestrians

Vehicle speeds 17 to 18 good visibility of pedest

Pedestrian islands at intersections with channelized turn lanes should be designed to increase pedestrian visibility and slow vehicle speeds (ITE).

Island can be used for low plantings to provide stormwater management and prevent vehicle encroachment. At-grade pedestrian cut-throughs increase accessibility. (StreetsblogNYC)

Photos & diagrams

APPLICATION:

- Should be considered at all pedestrian crossings where total roadway width exceeds 60' (Smart Transportation Guidebook).
- High volume intersections with 4 or more lanes.
- Large intersections where signal timing may not allow pedestrians to cross in one phase.
- Intersections with difficult crossing geometry.

CONSIDERATIONS:

- Streets Department considers on a case-by-case basis.
- Painted islands or medians (4.7.3) have lower maintenance costs, but provide limited protection for pedestrians.
- Should be designed to discourage vehicles from encroaching onto them (e.g., include plantings or bollards).
- Can be used as green infrastructure as long as planting heights are restricted near intersections to preserve sight lines.
- When designed correctly, channelized right turn lanes can increase pedestrian visibility and decrease crossing distance; however, channelized right-turns should be avoided where possible in areas with significant pedestrian activity and reserved for approaches with 200-300 right turns per hour. Wherever possible and appropriate, channelized turn lanes in high pedestrian activity areas should be redesigned to create pedestrian plazas and/or stormwater planters (4.4.9).

DESIGN:

- Treatments and widths vary based on design.
- Refuge islands must provide 5' clear walking zone width.

Parameters & criteria for application

- Recommended minimum median width is 6':
  - Detectable warning surfaces are not required at pedestrian refuge islands that are cut-through at street level and are less than 6' wide.
  - At signalized locations with pedestrian refuges less than 6' wide, the signal should be timed to allow pedestrians to cross the entire street in one phase.
- Include curb ramps (4.3.3) or at-grade pedestrian cut-through (equal to or greater than the clear width of approaching sidewalks) and median "nose" for safety and access.
- Where justified, channelized turn islands should be designed at a low angle for low speeds (5-10 mph) and high pedestrian visibility. It is preferable for right turns and the pedestrian crossing to be signalized.
- Consider providing Z-shaped median crossings on wide, high-speed roadways or adjacent to rail transit where space is available to force pedestrians to face oncoming traffic before crossing.
- GREEN STREET OPPORTUNITIES:
- Incorporate landscaping or stormwater planters (4.4.9).

ROLES & RESPONSIBILITIES:

- Streets Department installs and maintains pedestrian islands and medians.
- Developer is responsible for maintaining landscaped islands and medians. This requires an agreement with the City.
- PennDOT is involved on state routes.

Departmental responsibilities

Examples

EXAMPLES:

- Multiple locations on Spring Garden St
- 16th St and Benjamin Franklin Pkwy

Additional resources

RESOURCES:

- U.S. Access Board's Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way
- Smart Transportation Guidebook
- ITE Context Sensitive Solutions for Urban Thoroughfares

In contrast, London's Streetscape Guidance document did not provide the extensive details seen in Philadelphia's manual. Figure X provides an annotated excerpt of London's guidance for pedestrian refuge islands. While the document provides adequate overview for the importance of pedestrian crossings, the only information on pedestrian refuge islands (referred to as "central refuges") is recommended minimum dimensions.

Fig 7: London's Pedestrian Refuge Island Guidance (annotated)

Broad overview

Limited engineering standards

Signal controlled crossings

Pedestrians establish priority over vehicles at signal controlled crossings through the use of signal controlled pedestrian phases. Selection should be based on traffic volumes, speed and pedestrian flows, as well as whether the crossing is at a junction or standalone.

Pedestrian crossing facility (Ped-X)

This is the preferred crossing for all new, modified and modernised signal layouts. The layout appears similar to a pelican crossing with far-sided pedestrian aspects, but the traffic light sequence is as a signalised junction, has no flashing amber vehicle signal and usually includes a countdown timer.

Figure 138: A Ped-X crossing on Harrow Station Road with no pedestrian countdown timer

Layout criteria

Straight-across Ped-X crossings	
Preferred minimum crossing width	3,200mm
Maximum crossing width	10.0 metres
Dropped kerbs	1:20 preferred to 1:12 (maximum)
Additional requirements where a central refuge is provided	
Recommended minimum central refuge depth	2,000mm
Recommended minimum central refuge length	7,200mm
Kerb upstand around central refuge	125mm
Additional requirements for staggered Ped-X crossings	
Preferred minimum central refuge kerb to kerb	3,000mm
Minimum stagger distance between crossing points on central refuge	4,000mm recommended. Relaxations may be permitted with SDRG approval
Stagger for all two-way roads	Left stagger to face oncoming traffic, unless otherwise agreed with SDRG
Recommended minimum distance from uncontrolled junctions to primary signal pole	20.0 metres

Good practice

- Countdown timers should be considered for all Ped-X crossings
- Signal timings should be appropriate to pedestrian flows and traffic volumes
- All signal schemes are required to have a design and safety check in line with the Design Standards for Signal Schemes in London
- Tactile rotating cones should be fitted to all controlled crossings
- Audible bleepers should be fitted to standalone signal controlled crossings and 'all round' crossings at junctions as detailed in DfT Traffic Advisory Leaflets 4/91 and 5/91

Although Philadelphia was the highest scoring manual reviewed in my analysis, its high score does not necessarily lead to widespread adoption or efficacy in implementation. My interviewee mentioned that as the document provided recommendations rather than rules, it's flexibility detracted from the city's ability to easily enforce complete streets. Even though London's Streetscape document had much less detail on how and when to use each analyzed treatment, it was integrated into city regulation and therefore was much easier to implement. Philadelphia's Complete Streets Handbook six strengths are, for the most part, present in Los Angeles' Complete Streets Design Guide. Its failings are also mirrored in Los Angeles – the city has not formally integrated the CSDG into existing regulatory guidance for street design.

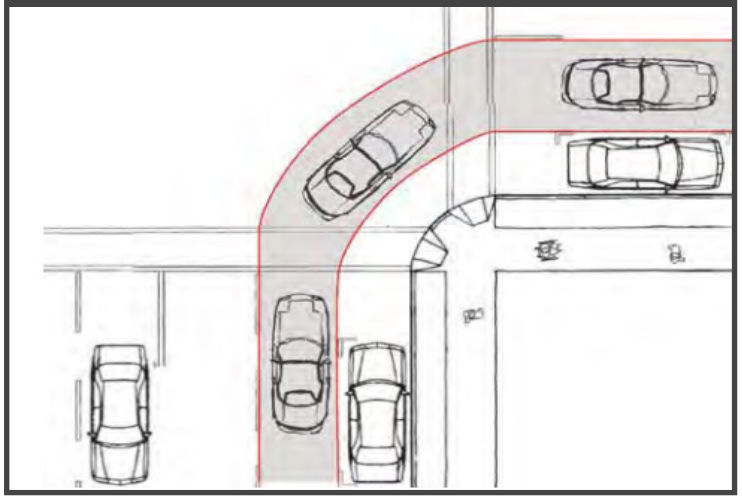
In the next section (pages 31-38), I highlight trends for each of the six priority treatments: **corner radii, curb extensions, pedestrian refuge islands, raised crosswalks, transit platforms,** and **roundabouts**. I focus on specific measurements and policies provided for each treatment, as well as the gaps in the information given in city manuals and guidelines.

CORNER RADII

No city prescribed blanket measurements for corner radii, but every city highlighted the benefits of tight radii and encouraged or mandated the use of shortest possible curb radii. This recommendation came along with the acknowledgement that larger vehicles experience difficulties navigating shorter curb radii, but all cities prioritize tight radii in dense urban areas.

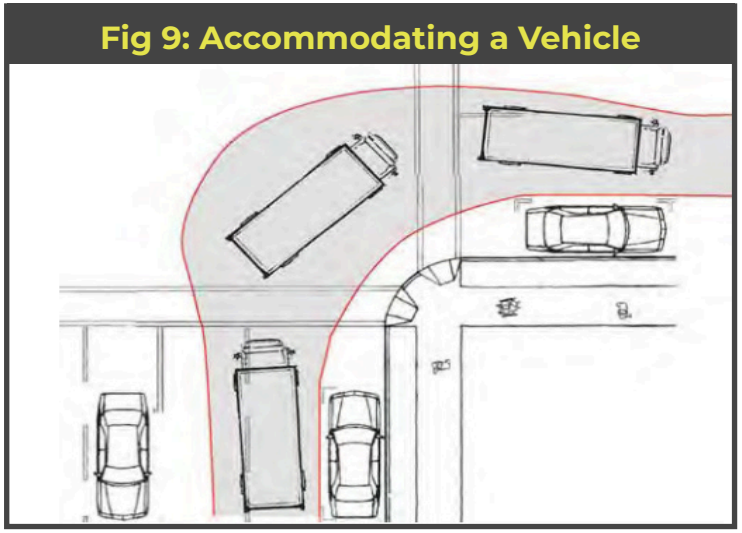
Radii should be based on the design vehicle (the largest frequent vehicle type turning at an intersection), as well as street typology. San Francisco called out the need to “design for” a vehicle using the shortest radii possible, rather than accommodating all vehicles. A range of 5’-10’ radii is preferred by the majority of cities, and some recommend a maximum radii (35’ in Dallas and 39’ in Mumbai).

Fig 8: Designing Radii for a Vehicle



Source: San Francisco’s Better Streets Plan

Fig 9: Accommodating a Vehicle



Source: San Francisco’s Better Streets Plan

Recommendations are generally much more constricting than current AASHTO Green Book standards, which provide a range of 10'-15' for intersections even with minimal truck traffic. However, all cities were consistent with AASHTO's analytical approach to selecting a design vehicle, and all recommended using data from traffic counts to determine the design vehicle size for radii.

AASHTO's recommendations are also at odds with existing guidelines in Los Angeles: the city's municipal code recommends 15', the BOE manual only provides guidelines for alleys, and the Complete Streets Design Guide recommends a range of 15' (for new intersections) to 40' (for industrial areas with high truck volumes).

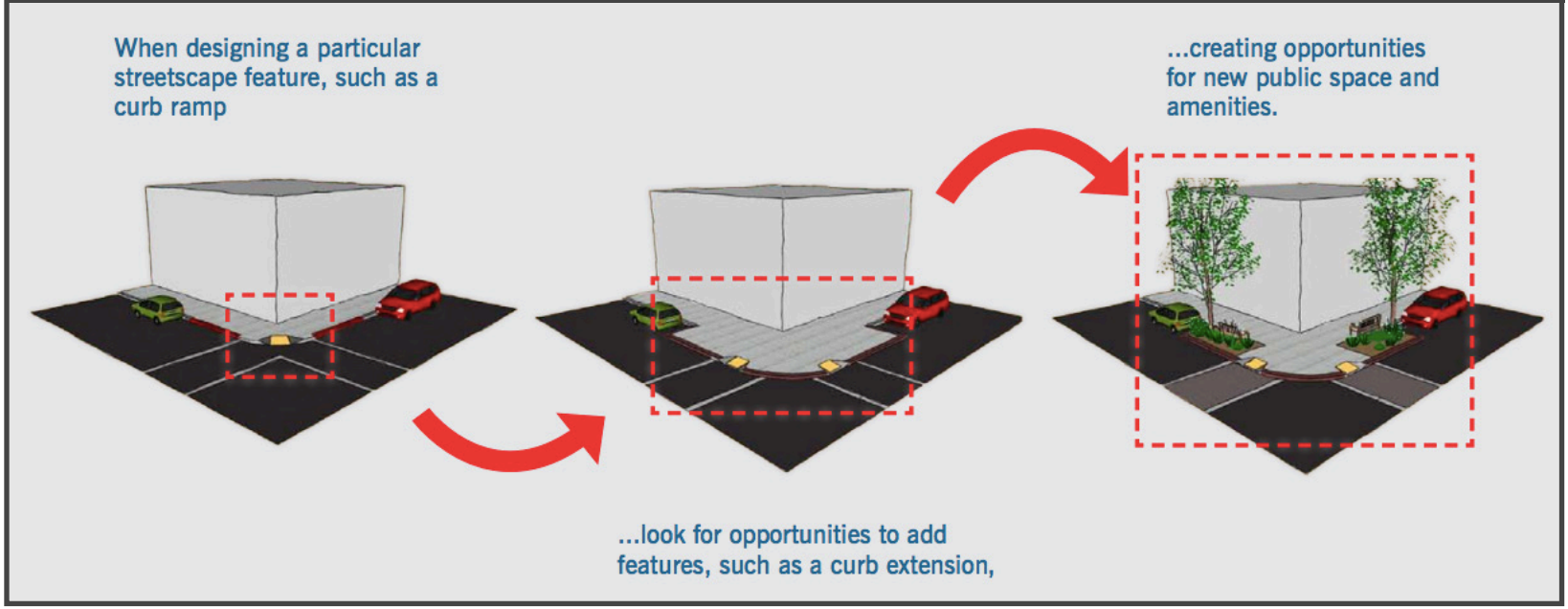
Fig 10: Tight Corner Radii in Toronto

Source: Toronto's Complete Streets Guidelines

CURB EXTENSIONS

All guidelines mention that curb extensions should be utilized only where on-street parking is present. Most recommend a 6' extension from the existing curb that is 1' – 2' offset from the adjacent lane. San Francisco is the only city analyzed that is aligned with current recommendations in Los Angeles, asking for curb extensions to extend the full length of the parking lane. Los Angeles' guidance on curb extensions is limited to the Complete Streets Design Guide – no standards are provided in manuals used by BOE, LADOT, or in the municipal code.

Fig 11: Curb Extension Guidance from San Francisco



Source: San Francisco's Better Streets Plan

San Francisco called out challenges with street sweeping, as the city's existing curb extensions are designed with wide radii to maintain access for street cleaning vehicles. Like San Francisco, Los Angeles is dealing with challenges with street sweeping – current BOE standards include a 25' curb radius to accommodate street cleaning vehicles. These curb extensions are an inefficient use of space: they result in increased parking loss, less space for pedestrians, and less sharply defined curb extensions. San Francisco recommends sharper radii and to avoid installing curb extensions on streets with mechanical street cleaning. Well-defined curb radii also provide opportunities for public space and placemaking, a tactic recommended by Toronto.

I noted two unconventional approaches to curb extensions from Philadelphia, San Jose and San Francisco: "stormwater bump-outs" and "paint & planters." Stormwater bumpouts are vegetated curb extensions – stone topped with soil and short plants. These bump-outs are placed lower than gutter elevation and connect to inlets to provide adequate drainage. Multiple cities mentioned potential stormwater challenges with

Fig 12: Landscaped Curb Extension in San Jose

Source: San Jose's Complete Streets Design Standards and Guidelines

curb extension installation – Atlanta recommends beginning the curb extension several inches from the curbline or including covered trench drains to allow water to flow. San Francisco recommends the Paint & Planters method in cases when physical conditions or funding preclude permanent (concrete) curb extensions. Los Angeles is currently using a version of the Paint & Planters method for a few intersections across the city, but the Department of Transportation sees it as an interim treatment before permanent curb extensions are installed.

PEDESTRIAN REFUGE ISLANDS

Most cities' guidelines are aligned in recommendations for placement of islands, advising installation in areas where streets cannot be narrowed and prioritizing commercial streets and intersections with high traffic volumes or pedestrian activity. Island widths should be 6' minimum, with all cities recommending a range from 8' to 10'. London is an outlier, as its guidelines recommend refuge islands at any potential crossing point, even when it is unmarked or uncontrolled. Dallas and San Jose call out opportunities for landscaping and stormwater planters. San Francisco provides guidance for choosing between curb extensions and pedestrian refuge islands as a pedestrian safety treatment, recommending refuge islands in street conditions with two-way left-turn lanes, wide travel lanes, 4 or more lanes, and/or where there is already an existing median. San Francisco also notes that refuge islands are significantly cheaper to construct than curb extensions.

Los Angeles has specific, limited constraints for utilization of what the BOE Manual refers to as "traffic islands" – they should be at least 50' square feet, and only used on "exceptionally wide roadways" or in areas where the volume of traffic makes it "difficult and dangerous" for pedestrians to cross. This conflicts not only with the city's CSDG (which recommends 40' islands), but also with many cities' policies for use of refuge islands – islands are encouraged in a variety of locations and no minimum size is mandated.

Fig 13: Pedestrian Refuge Island in Atlanta

Source: Streets Atlanta

RAISED CROSSWALKS

Guidelines across most cities recommend utilization on local streets only, and no city provided extensive guidance for raised crosswalks. Philadelphia calls out the treatment as most appropriate for retrofitting existing streets, claiming that new streets should be designed for low vehicle speed and good pedestrian visibility using other treatments besides raised crosswalks. San Diego recommends installing raised crosswalks in groups of two or more (about 300 feet apart) for increased effectiveness at traffic calming. Raised crosswalks are addressed in some detail in Los Angeles' Complete Streets Design Guide, Measurements are provided (recommended widths: 15' – 20'), materials are mentioned, and policies for where and when to utilize them are given. Unlike its peer cities, Los Angeles recommends using raised crosswalks in a broader range of street typologies, suggesting they be applied to both local and collector streets.

Fig 14: Raised Crosswalk in Toronto

Source: Toronto's Complete Streets Guidelines

Fig 15: Raised Crosswalk in Dallas

Source: Dallas' Complete Streets Handbook

ROUNDABOUTS

Every city except Mumbai provided guidance for roundabouts, and most advised prioritizing roundabouts over signals or 4-way intersections where possible.

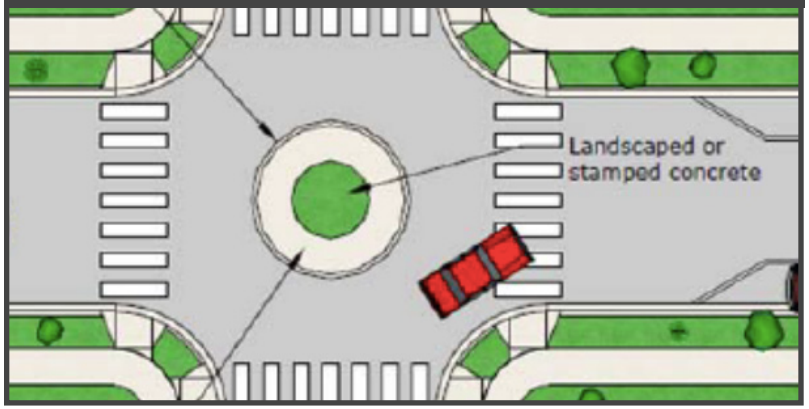
Center islands in roundabouts have a wide range of dimensional guidance, with some guidelines recommending 12' diameters while others go as large as 300'. London is currently trialing a "Dutch Roundabout," which separates cyclists from cars and is called out by the city as safer than traditional roundabouts. Atlanta, London, San Diego, and San Francisco propose taking advantage of the central area of the roundabout with landscaping or by installing public art.

Roundabouts are called out with specific measurements and applications in the Los Angeles Complete Streets Design Guide, and dimensional guidance is given for Traffic Mini-Circles and Mini-Roundabouts. Learning from other cities' mismatched definitions of roundabouts, Los Angeles should choose one definition and name it clearly.

Fig 16: Dutch Roundabout in London

Source: London's Streetscape Guidance

Fig 17: Roundabout Landscaping Diagram



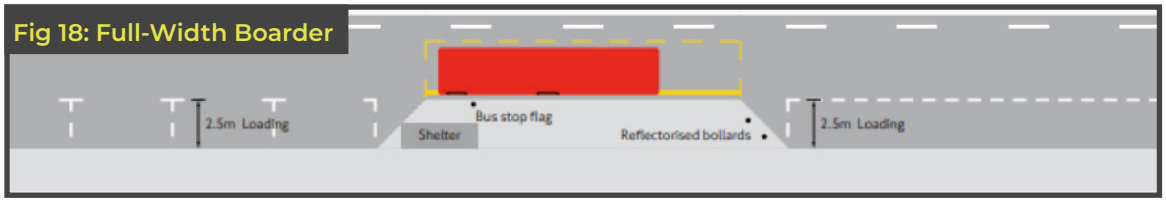
Source: San Diego's Street Design Manual

TRANSIT PLATFORMS

This treatment is universally recommended in areas with heavy transit and pedestrian activity, as long as there is a parking lane. San Francisco and Washington DC recommend transit platforms on every street with side-running transit and a parking lane. Washington DC calls out the potential hazard of implementing these platforms in high-speed areas, limiting deployment to streets with speeds under 45 mph. Aside from London, no city provides specific standards or measurements for size and design of transit platforms, referring readers instead to other transit-specific documents for more details on preferred dimensions.

London provides an innovative approach with two options for transit islands – what it calls "full width boarders" and "half width boarders." Full width boarders are transit platforms that take up the entire parking lane, and are viewed as the best solution for both buses and riders. A half-width boarder is a compromise – the platform extends only partially into the parking lane. Half-width boarders can be used in areas where full-width boarders are not possible, and still help minimize frequent delays.

Fig 18: Full-Width Boarder



Source: London's Streetscape Guidance

Fig 19: Half-Width Boarder

Source: London's Streetscape Guidance

RECOMMENDATIONS: LESSONS FOR LA

Based on my findings after reviewing and analyzing both the semi-structured interviews and each city's design guidelines document, I recommend the following policies:

Prioritize Recommendations over Regulations

Ensuring guidelines are integrated into city rules and regulations is a difficult process, requiring input and approval from multiple departments. It is much simpler to develop recommendations and a set of best practices. It is much simpler to develop recommendations and a set of best practices. However, recommendations lack the enforcement power necessary to implement complete streets projects.

In Dallas, not every city employee saw the new complete streets manual (which took the form of recommendations and not regulations) as "something that had to be followed." This has hindered citywide adoption and implementation of the department's vision. In contrast, San Francisco's street design manual is formalized in the city's planning code, and planners and engineers are mandated to refer to it when dealing with developments or projects of a certain size. Cities with documents that function as recommendations have divergent views on its effectiveness. Toronto states that a regulatory document could "reduce flexibility," but that for cities that are behind in their implementation of compete streets, policies can be helpful to create clarity about the vision and intent. Los Angeles' Street Design Manual is approaching 40 years old, and thus would benefit from an update to its regulations.

Choose Flexibility over Specificity

All interviewees touched on the difficulties of navigating the sweet spot between too much specificity and too much flexibility. Specifics in design guidelines ease implementation. For example, it is much easier to design a pedestrian refuge island for a specific crosswalk when details on approved locations, measurements, and materials are provided in design guidelines.

However, over-prescriptive guidelines can limit where and when a treatment can be deployed. Current conflicting guidance in Los Angeles recommends 40 or 50 sq ft for pedestrian refuge islands, which eliminates the treatment as a possibility on many of the city's narrower streets. Based on existing city guidance, this traffic calming treatment is now unusable in many contexts where it could benefit pedestrians if its size requirements were slightly modified.

While it may be desirable, it is impossible to create specific guidelines for every context that engineers, planners, and urban designers will face on their city streets. Therefore, design guidelines in Los Angeles should aim for measured flexibility – providing a range of standards and measurements based on different street typologies, and acknowledging the potential for modification based on context.

Create Unified Documentation

Only one city (San Diego) created design guidelines meant to be utilized by both engineers and planners. Besides San Diego, every other city had at least one other document that users had to refer to in order to get a full picture of requirements, policies, and/or measurements and standards to implement many design treatments. While robust documentation is commendable, it can also be overwhelming and confusing. When a developer is forced to read through and understand four or five technical manuals instead of just one or two, the likelihood that the new development will contain a mistake increases.

Multiple cities stated that despite adoption of new street design guidelines, many departments still refer to older existing engineering handbooks. In Atlanta, city staff are now working toward creating a "real comprehensive design engineering manual" beyond their current guidelines that includes "prioritizing safety and multimodal streets, as well as pedestrian and bicycle prioritization." Dallas is also working to integrate current engineering guidelines with their newer complete streets manual.

If Los Angeles wants to facilitate adherence to policies and regulations for design, it is in the city's best interest to have all necessary

information in one place. However, if aligning multiple department guidance into one manual is not feasible, I recommend following Philadelphia's example in its Complete Streets Design Handbook and explicitly reference other documents and resources. Additional benefits of Philadelphia's design manual format are detailed on pages 27-28.

CONCLUSION

Attitudes and goals around street design have come a long way since the car-centric, forgiving design of the mid-twentieth century. All ten cities analyzed in this report are dealing with large urban populations and built-out environments where wholesale change to street design is, for the most part, politically and financially infeasible.

Every city expressed commitment to safer streets with more consideration given to pedestrians, cyclists, and transit riders, and less emphasis placed on single-occupancy car travel. However, each city had to deal with its specific political and spatial context – outcomes were often dependent on factors outside of the control of staffers creating new or updated complete streets guidelines.

Two main outside factors include:

City Leadership & Established Priorities: Cities without existing complete streets policies were in a tougher position than cities who were already on-board with complete streets philosophies – staff had to start from scratch without internal documents or regulations to draw from or to point to as examples when creating their street design guidelines. However, existing city design priorities were not as influential as the personalities and motivations of staff and leadership attempting to create or update design guidance. No city was able to move forward without leadership buy-in and support. Washington D.C summed up the importance of a motivated team, saying “design guidance is one thing, but the attitudes and beliefs of staff are actually a much bigger component in getting good projects moving.”

Existing Built Environment and Infrastructure: For car-oriented cities, existing built-out neighborhoods and communities could pose challenges for creating complete streets. Travelers in such cities are used to streets constructed in alignment with 1950’s-1960’s nationwide

best street design practices (roadways built with forgiving design to prioritize single-occupancy car travel). Networks of wide arterials paired with sprawling urban areas seen in cities like Dallas, San Diego and San Jose create an environment where large-scale changes that slow down car traffic are expensive and often politically dicey. In comparison, people-oriented cities often have urban cores with narrow streets and more robust transit infrastructure. Significant safety improvements on a two-lane street in San Francisco with frequent pedestrian traffic could be achieved with a pedestrian island or a curb extension, while a six-lane arterial in Dallas may require road reconfiguration along with a variety of design treatments – which is much more expensive and could receive blowback from constituents used to streets that give preference to cars. People-oriented cities can benefit from certain aspects of their built environment, as complete streets treatments may be both cheaper and more politically feasible than the interventions required for corridors in car-oriented cities.

Final Thoughts

Despite being categorized as a car-oriented city, Los Angeles is moderately well-positioned to take next steps towards street design guidance that promotes complete streets as well as a regulatory landscape to ensure that complete street priorities are implemented. Current leadership has proven to be a strong proponent of complete streets policies, and existing documents like the Complete Streets Design guide lays out a vision for a Los Angeles with safer, multimodal streets. Next steps are to officialize and operationalize the vision of the CSDG.

Challenges in implementation could be quite large, as the existing built environment is often not conducive to quick fixes for safer streets. While recent projects like MyFig shine as an example of modifying large, car-oriented arterials into multimodal streets safer for pedestrians, cyclists, and transit riders, the majority of Los Angeles' streets still cater to cars. Despite these challenges, Los Angeles can take advantage of leadership and existing policy guidance to move toward better streets for all users.

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APPENDIX A

City	Staff Interviewed	Documents Reviewed
Atlanta	Andrew Walter, Assistant Director, Office of Mobility Planning	Streets Atlanta
Dallas	Jared White, Manager II, Department of Transportation	Complete Streets Handbook
Philadelphia	Ariel Ben-Amos, former Senior Planner, Mayor's Office of Transportation and Utilities	Complete Streets Design Handbook
London	Lucinda Saunders, Consultant	Healthy Sts Approach; London Streetscape Guidance
Mumbai	Rohit Tak, Consultant	Street Design Guidance for Greater Mumbai
San Diego	Samir Hajjiri, Senior Traffic Engineer & George Ghossain, Traffic Engineer, Department of Transportation	Street Design Manual
San Francisco	James Shahamiri, Engineer, SFMTA	Better Streets Plan
San Jose	Doug Moody, Transportation Planner, Department of Transportation	Complete Streets Design Standards and Guidelines
Toronto	Kristina Reinders, Senior Urban Designer, City Planning	Complete Streets Guidelines
Washington DC	George Branyan, Active Transportation Branch Manager & Kelsey Bridges, Transportation Planner, Department of Transportation	Public Realm Design Manual; Design and Engineering Manual

APPENDIX B

Interview Instrument for Complete Street Design Manual Creation & Implementation

Purpose/Context: I am studying public agencies in large cities across the globe who have created street design guidelines with a focus on complete streets. The City of Los Angeles is currently updating street design guidelines that have been untouched since the 1980s, and I am to provide case studies to analyze best practices and lessons learned from peer agencies.

Why make a manual/set of guidelines?

1. Was this an update to an older manual, or the development of something new?
2. What was the reason for the update/creation of the manual/guidelines?
3. Is the document suggested guidelines, or integrated into the city's current regulatory environment (i.e. zoning, project development policies, etc)?
    a. What type of street design document would you recommend to other agencies? Recommendations or regulations?

General Process / Content

1. Which agency or department was in charge of creating the manual/guidelines?
    a. How do the guidelines interact with and impact other departments/agencies working in the public ROW?
2. Did you invite outside stakeholders to participate in manual development? Specifically, did you consider contracting with an academic institution to develop the design guidelines? Why or why not?
3. How much did you budget for the creation/update of the manual? Where did you end up spending the bulk of your budget?

Audience and Format

1. Who is the target audience for the manual? For example, were there audiences you didn't consider that are not addressed in the manual or are now using it?
2. What formats for the manual did you consider, and how is it available now? If you could change the format, what would you adjust?

Opportunities/Challenges

1. What were the specific pain points in creating the guidelines?
    a. Was staff enthusiastic? Did you experience internal disagreement?
    b. Was there an existing process to update/create street design guidelines?
    c. Were the guidelines an agency priority?
2. How did you address any obstacles or pain points you encountered?
3. Do you feel the guidelines provide enough flexibility for planners and engineers using it?
4. Does the document also have enough specificity to allow for practical application?
5. Did you include design exceptions? Why or why not?
6. What elements of the guide did you feel were most successfully implemented?

Takeaways

1. Is the manual both internally and externally useful? Should it be focused on one more than the other?
2. With rise of new transportation technology and shared mobility, will street design manuals need to be adjusted again? Do you see the need for an update in the near future (the next 10 years?)

APPENDIX C

Category of Evaluation	Points Given
Policies and Procedures	**3 points:** Design treatment is defined, reasons for use are described, and context and approved locations for use are given.
	1 point: Design treatment is defined, minimal or no description of where and why to use treatment.
	0 points: No reference to policies and procedures for the specific design treatment found in the entire document.
Geometric Design Parameters	**3 points:** Specific measurements and standards are given for the specific design treatment.
	1 point: Recommendations or a range of measurements are given for the specific design treatment.
	0 points: No measurements or standards given.
Integration with Utilities and Stormwater	**3 points:** Specific reference to integration with utilities and/or stormwater for specific design treatment is made.
	1 point: Broad reference to utility/stormwater integration is made somewhere in the document (not specific to design treatment).
	0 points: No reference to integration with utilities and stormwater found in the entire document.
Accessibility Accommodations	**3 points:** Specific reference to accessibility for specific design treatment is made.
	1 point: Broad reference to accessibility is made somewhere in the document (not specific to design treatment).
	0 points: No reference to accessibility in the entire document.

Category of Evaluation	Points Given
Maintenance Responsibilities	**3 points:** Specific reference to maintenance of specific design treatment is made.
	1 point: Broad reference to maintenance is made (not specific to the design treatment).
	0 points: No reference to maintenance in the entire document.
Graphics & Tables	**3 points:** Multiple graphics are shown - at least one diagram and/or one photo are shown to illustrate design treatment.
	1 point: One graphic or table is used.
	0 points: No graphics or tables are included.
Public Space & Programming	**3 points:** Specific reference to public space and programming for the specific design treatment is made.
	1 point: Broad reference to public space and programming is made (not specific to the design treatment).
	0 points: No reference to public space and programming is made

APPENDIX D

Design Treatment Scores by City

Corner Radii

	Policies and Procedures	Geometric Design Parameters	Integration with utilities and stormwater	Accessibility accommodations	Maintenance responsibilities	Graphics/Tables/ Standards	Public Space and Programming
Mumbai	1	1	0	0	0	3	0
London	1	1	0	0	0	1	0
Toronto	1	0	0	0	0		0
San Diego	0	3	0	0	0	3	0
San Jose	3	3	0	0	0		0
San Francisco	3	3	0	1	0	3	0
Atlanta	3	1	1	0	0		0
Dallas	3	3	0	0	0	3	0
DC	3	3	0	0	0	3	0
Philadelphia	3	3	1	0	3	3	0

Curb Extensions

	Policies and Procedures	Geometric Design Parameters	Integration with utilities and stormwater	Accessibility accommodations	Maintenance responsibilities	Graphics/Tables/ Standards	Public Space and Programming
Mumbai	1	1	0	0	0	3	0
London	1	0	0	0	0	0	0
Toronto	3	0	3	1	0	3	0
San Diego	3	1	1	1	0	3	0
San Jose	3	0	3	1	0	3	3
San Francisco	3	3	3	0	0	3	3
Atlanta	3	3	3	1	0	3	1
Dallas	3	3	1	1	1	3	
DC	3	3	3	0	0	0	0
Philadelphia	3	3	3	0	3	3	3

Pedestrian Refuge Islands

	Policies and Procedures	Geometric Design Parameters	Integration with utilities and stormwater	Accessibility accommodations	Maintenance responsibilities	Graphics/Tables/ Standards	Public Space and Programming
Mumbai	1	1	0	0	0	3	0
London	3	3	0	0	0	3	0
Toronto	3	0	0	3	0	0	3
San Diego	3	3	0	0	0	3	0
San Jose	1	3	3	0	0	3	0
San Francisco	3	3	0	0	0	3	0
Atlanta	3	3	1	3	0	3	0
Dallas	3	3	1	0	0	3	0
DC	3	3	1	0	0	0	0
Philadelphia	3	3	1	0	3	3	0

Raised Crosswalks

	Policies and Procedures	Geometric Design Parameters	Integration with utilities and stormwater	Accessibility accommodations	Maintenance responsibilities	Graphics/Tables/ Standards	Public Space and Programming
Mumbai	3	3	1	1	1	3	0
London	0	0	0	0	0	3	0
Toronto	3	0	0	0	0	3	0
San Diego	3	3	0	0	0	3	0
San Jose	0	0	0	0	0	0	0
San Francisco	1	1	0	0	0	3	0
Atlanta	3	1	3	0	0	0	0
Dallas	3	1	0	0	0	0	0
DC	3	3	1	0	1	0	0
Philadelphia	3	3	3	0	3	3	0

Roundabouts

	Policies and Procedures	Geometric Design Parameters	Integration with utilities and stormwater	Accessibility accommodations	Maintenance responsibilities	Graphics/Tables/ Standards	Public Space and Programming
Mumbai	0	0	0	0	0	0	0
London	1	0	0	0	0	3	3
Toronto	0	0	0	0	0	0	0
San Diego	3	3	0	0	0		0
San Jose	3	0	0	0	0	0	3
San Francisco	3	3	0	1	0	3	3
Atlanta	3	3	1	0	0	3	1
Dallas	3	1	1	1	0	3	0
DC	3	3	3	3	0	3	0
Philadelphia	3	3	1	0	3	3	3

Transit Platforms

	Policies and Procedures	Geometric Design Parameters	Integration with utilities and stormwater	Accessibility accommodations	Maintenance responsibilities	Graphics/Tables/ Standards	Public Space and Programming
Mumbai	3	3	0	1	0	3	0
London	3	3	0	0	0	3	0
Toronto	3	0	0	0	0	0	0
San Diego	0	0	0	0	0	0	0
San Jose	3	3	0	0	0	3	0
San Francisco	3	3	0	0	0	3	0
Atlanta	3	3	1	0	0	3	0
Dallas	1	0	0	0	0	3	0
DC	3	3	3	0	0	3	0
Philadelphia	1	1	1	0	0	3	0

APPENDIX E

Normalized scores by category and design treatment

	Policies & Procedures	Geometric Design Parameters	Integration with utilities and stormwater	Accessibility Accommodations	Maintenance Responsibilities	Graphics, Tables and/or Standards	Public Space and Programming	**Design Treatment Average**
Corner Radii	0.81	0.81	0.08	0.04	0.12	0.73	0	**0.37**
Curb Extensions	1	0.65	0.77	0.19	0.15	0.92	0.38	**0.58**
Pedestrian Refuge Islands	1	0.96	0.27	0.23	0.12	0.92	0.12	**0.52**
Raised Crosswalks	0.85	0.58	0.31	0.04	0.19	0.69	0	**0.38**
Round abouts	0.85	0.58	0.31	0.04	0.19	0.69	0	**0.38**
Transit Platforms	0.85	0.62	0.23	0.19	0.12	0.69	0.50	**0.46**
Category Average	**0.88**	**0.73**	**0.15**	**0.04**	**0**	**0.9**	**0**	**0.39**